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GOODWIN PROCTER LLP
PATENT ADMINISTRATOR
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BEFORE THE BOARD OF PATENT APPEALS

AND INTERFERENCES

Application Number: 10/790,584

Filing Date: March 01, 2004

Appellant(s): SHU ET AL.

Joel E. Lehrer

For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 02/01/2008 appealing from the Office action mailed 08/10/2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

7,006,453	Ahmed et al.	2-2006
2004/0219909	Kennedy et al.	11-2004
2005/0076054	Moon et al.	04-2005

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims 1-26.

The Final Office Action 08/10/2007 has been updated for clarification purpose below.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. **Claims 1-8, 10-16, 21-23 and 25** are rejected under 35 U.S.C. 102(e) as being anticipated by **Ahmed et al. (7,006,453).**

Consider claim 1, Ahmed teaches a method for communicating via a network comprising nodes (**see the abstract, fig 1**), the method comprising:

predicting a future physical location where a destination node will be located upon arrival of a message unit relayed to the destination node via the network (**see the abstract, col 2 lines 15-40, col 4 lines 64-67, col 5 lines 1-30**); and

selecting an intermediate node for relaying the message unit between a source node and the destination node in response to the predicted a future physical location of the destination node (**col 2 lines 15-40, col 4 lines 64-67, col 5 lines 1-30 and 48-60**).

Consider claim 22, Ahmed teaches an apparatus for routing communications via a network

comprising nodes (**figure 11**, **see col 2 lines 64-67, col 3 lines 1-25, 50-65**), the apparatus comprising:

a location prediction processor for predicting a future physical location where a destination node will be upon arrival of a message unit at the destination node (**figure 11, see col 2 lines 64-67, col 3 lines 1-25, 50-65**);

a relay node selector for selecting an intermediate node for relaying the message unit between a source node and the destination node in response to the predicted a future physical location of the destination node (**figure 1**, **col 2 lines 15-40, col 4 lines 64-67, col 5 lines 1-30**).

Consider claim 2, as applied to **claim 1**, Ahmed teaches selecting the intermediate node comprises predicting locations where a plurality of nodes of the network will be upon arrival of the message unit at each of the plurality of nodes, and performing the selection in response to the predicted location of the destination node and the predicted locations of the plurality of nodes (**see col 2 lines 20-40, col 4 lines 7-24, 60-67, col 5 lines 1-30**).

Consider claim 3, as applied to **claim 2**, Ahmed teaches wherein the steps of predicting the locations of the plurality of nodes and selecting the intermediate node are performed by at least one of the plurality of nodes (**col 2 lines 20-40, col 4 lines 7-24, 60-67, col 5 lines 1-30**).

Consider claim 4, The method of **claim 3**, Ahmed teaches wherein the steps of predicting the locations of the plurality of nodes and selecting the intermediate node are performed simultaneously (**see figures 4, 7 col 2 lines 13-40, col 4 lines 25-67, col 5 lines 1-30,** describing destination locations being located by using the geometry-based routing protocol with intermediate nodes inherently occur at same time).

Consider claim 5, as applied to **claim 3**, Ahmed teaches wherein predicting the locations of the plurality of nodes occurs upon arrival or prior to arrival of the message unit at each of the plurality of nodes (**col 1 lines 65-67, col 2 lines 1-10, col 5 lines 48-60**).

Consider claim 6, as applied to **claim 3**, further comprising sharing the predicted locations of the plurality of nodes with other nodes of the plurality of nodes (**see col 2 lines 29-40, col 3 lines 10-**

15, 50-67, disclosing each node knows other nodes' location information).

Consider claim 7, as applied to **claim 2**, wherein selecting the intermediate node comprises predicting locations where a plurality of nodes of the network will be upon arrival of the message unit at each of the plurality of nodes, and performing the selection in response to the predicted location of the destination node and the predicted locations of the plurality of nodes for relaying the message via at least one of the plurality of intermediate nodes (**see col 2 lines 15-40, col 4 lines 7-35, col 5 lines 1-30**).

Consider claim 8, as applied to **claim 7**, further comprising causing at least one of the source node and the plurality of nodes to attach to the message unit state information comprising at least one of a prior speed, a prior direction, a prior destination, and a prior location of at least one of the nodes (**see col 3 lines 1-25, col 8 lines 1-15**).

Consider claim 10, as applied to **claim 2**, Ahmed teaches wherein selecting the intermediate node further comprises selecting a sequence of at least one intermediate node of the plurality of nodes whose predicted location is closer to the predicted location of the destination node than is at least one other node of the plurality of nodes (**col 4 lines 64-67, col 5 lines 1-30**).

Consider claim 11, as applied to **claim 1**, Ahmed teaches wherein selecting the intermediate node comprises selecting a node whose predicted location is within a transmission range for receipt of the message unit (**col 3 lines 25-36, col 4 lines 33-45, col 7 lines 55-64**).

Consider claim 12, as applied to **claim 1**, Ahmed teaches wherein the location of the destination node is predicted in response to state information associated with a prior state of the destination node, the state information comprising at least one of a prior speed, a prior direction, and a prior location of the destination node, and a time stamp identifying an age of the state information (**see col 3 lines 1-25, col 8 lines 1-15**).

Consider claim 13, as applied to **claim 12**, Ahmed teaches further comprising causing the state information to be attached to the message unit, and causing at least one of the intermediate node and the destination node to retrieve, alter, and reattach the state information, wherein altering comprises (i) replacing at least a portion of the state information with information having a more recent time

stamp or (ii) adding information having a more recent time stamp (**see col 3 lines 1-25, col 7 lines 64-67, col 8 lines 1-15 and lines 40-55**).

Consider claim 14, as applied to **claim 1**, Ahmed teaches further comprising causing a node of the network to broadcast to a plurality of nodes of the network a request for state information of the plurality of nodes (**see col 6 lines 34-50**).

Consider claim 15, as applied to **claim 1**, Ahmed teaches further comprising attaching to the message unit information identifying the predicted location of the destination node (**col 2 lines 13-30, col 4 lines 45-67, col 5 lines 1-30**).

Consider claim 16, as applied to **claim 1**, Ahmed teaches further comprising causing the intermediate node to select a next intermediate node for relaying the message unit between the intermediate node and the destination node in response to the predicted location (**see figures 1, 2, 5, 7 and 9, col 4 lines 7-32, col 5 lines 1-30**).

Consider claim 21, as applied to **claim 1**, Ahmed teaches wherein the message unit is associated with a binary data packet, and further comprising repeating predicting and selecting for each one of a series of data packets (**see col 6 lines 5-20**).

Consider claim 23, as applied to **claim 22**, Ahmed teaches further comprising a state information storage unit for storing state information associated with at least one of a prior state and a predicted state of at least one node of the network (**see fig 11, number 960, col 3 lines 1-25, col 5 lines 48-60**).

Consider claim 25, as applied to **claim 22**, Ahmed teaches further comprising a state information examination unit for examining state information attached to the message unit (**col 3 lines 1-25**).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. **Claim 9** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Ahmed et al. (7,006,453)** and further in view of **Kennedy (2004/0219909).**

Consider claim 9, as applied to **claim 7,** (Original) The method of claim 7, further comprising causing one of the selected plurality of intermediate nodes to alter a routing list of future intermediate

nodes of the selected plurality of intermediate nodes when the predicted location of the destination node was based on outdated information.

Ahmed does not specifically show "altering a routing list of future intermediate nodes of the selected plurality of intermediate nodes when the predicted location of the destination node was based on outdated information". However, it is noticeable Ahmed discusses the routing list is updated regularly as fast depending on the mobility of nodes in the ad hoc network (see column 6 lines 20-25), thus the concept of information outdated is just a matter of seconds, and the new current or future information is updated quickly and periodically depending on mobility of nodes. In same field of endeavor, Kennedy teaches a method and system for predicting routing using fuzzy logic in a mobile ad hoc network (see the abstract), where Kennedy discloses the future routes are predicted based on the historic and current data (see [28]-[30]), thus Kennedy discloses the routing of messages based on future location prediction. Kennedy also discloses route failure and performing alternative routes prediction to replace routed predicted to fail (see [33]-[34]), thus Kennedy discloses "altering a routing list of future intermediate nodes of the selected plurality of intermediate nodes when the predicted location of the destination node was based on outdated information". Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention was made to modify teachings of Ahmed and have "altering a routing list of future intermediate nodes of the selected plurality of intermediate nodes when the predicted location of the destination node was based on outdated information", taught by Kennedy, to improve the method and system discussed by Ahmed.

7. **Claims 17-20, 24 and 26** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Ahmed et al. (7,006,453)**, further in view of **Moon et al. (2005/0076054)**.

Consider claim 17, as applied to **claim 1**, further comprising acquiring geographic information identifying physical features.

Ahmed does not show " physical features that may interfere with the network". In same field of endeavor, Moon teaches a wireless network related to a mobile ad hoc network basis (see the abstract, sections [2]-[5]), where Moon discloses each mobile node includes mobility platform configured to

supply sensor data about the environment objects, an executable routing resource configured to generate movement directives and decisions about the evaluated objects in the world/environment (see [36]-[37]), thus all nodes in the network know the surrounding environment that may have objects, obstacles, so they can establish a self adapting, autonomous wireless network that can adjust to detect changes in physical space, network topology space or wireless link space for communication (see sections [19]-[20], [36]-[37], [40]). Thus, it would have been obvious to a person of ordinary skill in the art at the time of the invention was made to modify teachings of Ahmed and have "geographic and physical features that may interfere with the network may be considered when making routing decisions based on predicted future locations" taught by Moon, to improve the method and system discussed by Ahmed.

Consider claim 18, as applied to **claim 17**, Ahmed as modified by Moon, teaches wherein the physical features interfere with network communications (**pars [19], [20], [36], [39], [46], [50], [58], [65]-[67], [72], [73]**).

Consider claim 19, as applied to **claim 17**, Ahmed as modified by Moon, teaches wherein acquiring geographic information comprises inferring the physical features from attenuation of at least one transmitted signal (**pars [19], [20], [36], [39], [46], [50], [58], [65]-[67], [72], [73]**).

Consider claim 20, as applied to **claim 17**, Ahmed as modified by Moon, teaches wherein selecting the intermediate node comprises selecting a node whose predicted location is essentially unobstructed by the physical features (**pars [19], [20], [36], [39], [46], [50], [58], [65]-[67], [72], [73]**).

Consider claim 24, as applied to **claim 22**, Ahmed as modified by Moon, further teaches a geographic information storage unit for storing geographic information identifying physical features that obstruct the network communications (**see figure 11, numbers 960 and 970**).

Consider claim 26, as applied to **claim 25**, Ahmed as modified by Moon, further teaches wherein the state information examination unit examines geographic information attached to the message unit (**col 3, lines 1-25**).

(10) Response to Argument

Summary of Background of Technology:

The invention is about MANET routing method based on position estimations of nodes in a mobile ad hoc networks, where routing messages from an original node to a destination node by making use of a selected a relay node or an intermediate node that knows the location of the final destination node at the time the messages arrive at the destination node. In the mobile network, nodes carry information about the locations and trajectories of other nodes in their neighborhoods by sharing and updating location and trajectory information with one another before sending a message. As a result, the originating node estimates the expected location of the destination node and sends messages along a best route towards that location.

Summary of Examiner's stance:

Ahmed is discussing a location-based or position-based routing method and system for ad hoc networks (see the abstract, column 3 lines 50-56), where each node in the network maintains location list of other nodes in its neighborhood (see column 3 lines 58-67, column 4 lines 1-23). The location list includes information regarding location information of nodes. The location information is updated periodically thus a node is always guaranteed of current information of its neighboring nodes (see column 2 lines 13-40, column 6 lines 20-25, col 7 lines 65-67, col 8 lines 1-50). A source node performs the geometry-based routing protocol to identify a closest node (i.e., intermediate node) to a destination node, once the closest node is defined, the source node sends messages through the best estimated path to the destination node (see column 5 lines 1-21). Also, Ahmed is discussing nodes in the ad hoc network use GPS equipment for determining relevant positions (see col 3 lines 50-55, col 6 lines 35-62).

Appellant main argument in the Appeal Brief:

Claims 1-8, 10-16, 21-23 and 25.

Appellant asserts on pages 5 and 6 of the that Ahmed does not disclose or suggest " the ability to predict the future location of a network node and use that information to influence routing of messages sent through the network"

Examiner respectfully disagrees. As a matter of fact, Ahmed teach a position-based routing method in a Ad hoc network, where a node knows its neighboring nodes about their location information, the location information is updated periodically at faster or slower rates depending on the mobility of nodes of the ad hoc network (see column 6 lines 20-25, see the Summery of Examiner's stance above).

As a result, the examiner contend that the argued features shown by the prior art.

Claim 9

Appellant asserts on page 6 of the Appeal Brief that “Kennedy merely to show that a routing table associated with a network node can be updated if the information is deemed outdated, not to teach the routing of messages based on predicted future locations”.

Examiner respectfully disagrees. Ahmed teaches a position-based routing method in a Ad hoc network, where a node knows its neighboring nodes about their location information, the location information is updated periodically at faster or slower rates depending on the mobility of nodes of the ad hoc network (see column 6 lines 20-25, see the Summery of Examiner's stance above). Ahmed does not specifically show “altering a routing list of future intermediate nodes of the selected plurality of intermediate nodes when the predicted location of the destination node was based on outdated information”. However, it is noticeable Ahmed discusses the routing list is updated regularly as fast depending on the mobility of nodes in the ad hoc network (see column 6 lines 20-25), thus the concept of information outdated is just a matter of seconds, and the new current or future information is updated quickly and periodically depending on mobility of nodes. In same field of endeavor, Kennedy

teaches a method and system for predicting routing using fuzzy logic in a mobile ad hoc network (see the abstract), where Kennedy discloses the future routes are predicted based on the historic and current data (see [28]-[30]), thus Kennedy discloses the routing of messages based on future location prediction. Kennedy also discloses route failure and performing alternative routes prediction to replace routed predicted to fail (see [33]-[34]), thus Kennedy discloses "altering a routing list of future intermediate nodes of the selected plurality of intermediate nodes when the predicted location of the destination node was based on outdated information". Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention was made to modify teachings of Ahmed and have "altering a routing list of future intermediate nodes of the selected plurality of intermediate nodes when the predicted location of the destination node was based on outdated information", taught by Kennedy, to improve the method and system discussed by Ahmed.

As a result, the examiner contend that the argued features shown by the prior art.

Claims 17-20, 24 and 26

Appellant asserts on page 7 of the Appeal Brief that "Moon merely show that geographic and physical features that may interfere with the network may be considered when making routing decisions, but not to teach the routing of messages based on predicted future locations".

Examiner respectfully disagrees. Ahmed teaches a position-based routing method in a Ad hoc network, where a node knows its neighboring nodes about their location information, the location information is updated periodically at faster or slower rates depending on the mobility of nodes of the ad hoc network (see column 6 lines 20-25, see the Summery of Examiner's stance above). Ahmed does not show " physical features that may interfere with the network". In same field of endeavor, Moon teaches a wireless network related to a mobile ad hoc network basis (see the abstract, sections [2]-[5]), where Moon discloses each mobile node includes mobility platform configured to supply sensor data about the environment objects, an executable routing resource configured to generate movement directives and decisions about the evaluated objects in the world/environment (see [36]-[37]), thus all nodes in the network know the surrounding environment that may have objects, obstacles, so they can

establish a self adapting, autonomous wireless network that can adjust to detect changes in physical space, network topology space or wireless link space for communication (see sections [19]-[20], [36]-[37], [40]). Thus, it would have been obvious to a person of ordinary skill in the art at the time of the invention was made to modify teachings of Ahmed and have "geographic and physical features that may interfere with the network may be considered when making routing decisions based on predicted future locations" taught by Moon, to improve the method and system discussed by Ahmed.

As a result, the examiner contend that the argued features shown by the prior art.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Huy Ho/

Conferees:

Duc Nguyen, SPE 2617

/Duc Nguyen/

Supervisory Patent Examiner, Art Unit 2617

Nick Corsaro, SPE 2617

/Nick Corsaro/

Supervisory Patent Examiner, Art Unit 2617